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STUDIES OF LAKE MICHIGAN BOTTOM SEDIMENTS—NUMBER NINE

GEOLOGIC CROSS SECTIONS DERIVED FROM SEISMIC PROFILES AND SEDIMENT CORES FROM SOUTHERN LAKE MICHIGAN

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STUDIES OF LAKE MICHIGAN BOTTOM SEDIMENTS—NUMBER NINE

GEOLOGIC CROSS SECTIONS DERIVED FROM SEISMIC PROFILES AND SEDIMENT CORES FROM SOUTHERN LAKE MICHIGAN

Jerry A. Lineback, David L. Gross, and Robert P. Meyer

ABSTRACT

High-resolution seismic profiles and cores of bottom sediments have been used in the construction of geologic cross sections of southern Lake Michigan. Major stratigraphic units of the Pleistocene and the surface of the underlying Paleozoic bedrock can readily be distinguished.

Cross sections in the northern part of southern Lake Michigan (near Milwaukee, Wisconsin) cross the Mid-lake High. They show high relief on the bedrock surface, differentiate a thick glacial till, and indicate that in this area the Lake Michigan Formation is confined to low spots on the lake floor. A north-south cross section of the area shows a thick terminal moraine-like accumulation of till south of Milwaukee that pinches out southward.

Cross sections across the central part of the southern lake basin show that the Lake Michigan Formation is thick in the deep central part of the basin and in a band along the eastern shore. Cross sections in the extreme southern part of the lake indicate the Lake Michigan Formation thins southward. They also show that the formation is thick along the eastern shore but absent in the southwestern corner of the lake.

INTRODUCTION

Geologic cross sections that show details of bedrock topography and the distribution of Pleistocene sediments in the southern basin of Lake Michigan

		Fm	Member	Description
PLEISTOCENE SERIES	HOLOCENE STAGE	LAKE MICHIGAN	Ravinia	Sand on beaches
			Waukegan	Dark gray to brown, soft sandy silt to silty clay; sand
			Lake Forest	Dark gray silty clay with black beds and mottling; more compact than Waukegan Member
	? WISCONSINAN STAGE		Winnetka	Dark brownish gray clay; a few black beds and some black mottling
			Sheboygan	Reddish brown clay
			Wilmette Bed	Dark gray clay with some black beds
				Reddish brown clay
			South Haven	Reddish gray clay
	Unnamed	EQUALITY	Carmi	Gray, sandy, pebbly clay; clay; silt; clay-pebble conglomerate
		WEDRON	Unnamed	Reddish brown, silty, clayey till
			Wadsworth	Gray, silty, clayey till

Fig. 1 - Late Pleistocene sediments underlying southern Lake Michigan.

were constructed from data derived from high-resolution seismic profiles and cores of the bottom sediments. Approximately 1400 miles (2250 km) of seismic profiles and 118 stratigraphic cores have been collected for the mapping of sediment distribution. About 1000 miles (1600 km) of profiles and 40 of the cores were taken during a July 1971 cruise on the *R. V. INLAND SEAS*.

The results of the preliminary seismic profiling done in 1970 in southern Lake Michigan were reported by Lineback et al. (1971), who also discussed the geophysical technique used. In the 1971 investigation, reported here, essentially the same technique was used. Coring techniques have previously been described by Gross et al. (1970) and Lineback, Ayer, and Gross (1970). Descriptions of the cores collected in 1971 and of cores from a cruise made in the fall of 1970 but previously undescribed are included in the appendix. A summary of the interpretations presented in this paper was given by Lineback, Gross, and Meyer (1972). The composition of sediments in southern Lake Michigan was described by Gross et al. (*in press*).

Members of three Pleistocene formations (fig. 1) can be recognized and correlated, both in the cores and on the seismic profiles throughout the southern part of Lake Michigan. An additional stratigraphic unit may be present in the sequence of tills, and it is discussed later in this report. The bedrock surface appears as a strong acoustic reflector on many of the seismic records. Details of bedrock topography can be related to bedrock stratigraphy and to glacial erosion.

The Lake Michigan Formation, the uppermost of the three Pleistocene formations, consists of water-saturated, fine-grained clayey lacustrine sediments. It is acoustically relatively transparent, but it contains many reflecting horizons that extend for considerable distances and can be used to correlate the members of the formation. Underlying the Lake Michigan Formation is the glacial-lacustrine Carmi Member of the Equality Formation. The Carmi consists of alternating beds of clay, silt, sand, and clay pebble conglomerate that form closely spaced acoustic reflectors. Thin deposits of the Carmi Member, not recognized on the seismic records, in many places overlie glacial till that usually occurs between the Equality Formation and the bedrock. The till is seismically characterized by a strongly reflecting top and considerable internal scattering. In places, internal reflections can be traced through the till that indicate several till units may be present under the lake. Till in the southern part of the lake is assigned to the Wadsworth Member of the Wedron Formation (Woodfordian), but another (unnamed) till overlies the Wadsworth along the mid-lake high and is either a younger member of the Wedron or is of Valderan age and assignable to an as yet unnamed formation.

All measurements of thickness derived from seismic profiles in this study are based on the assumption that velocity of sound in all the measured sediments is the same as in water. Acoustic velocity measurements made on cores taken during the 1971 cruise (Silver and Lineback, *in preparation*) show that the velocity of sound in the Lake Michigan Formation typically varies from less than 10 percent faster to less than 10 percent slower than sound in water. This variation has a corresponding effect of less than 10 percent on the vertical scale of the geophysical profiles.

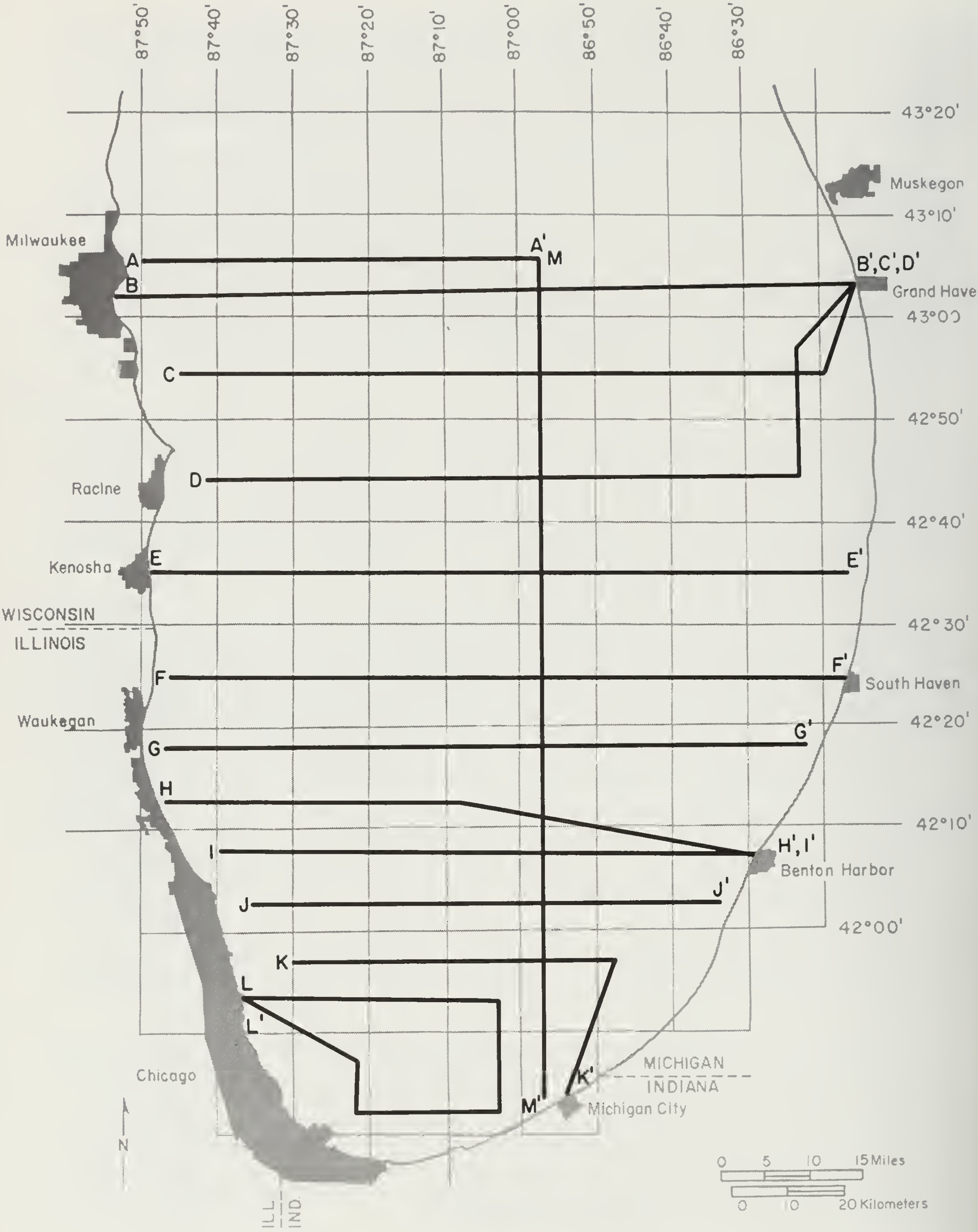

Fig. 2 - Index to geologic cross sections (figs. 3 to 6) of southern Lake Michigan.

Acknowledgments

We appreciate the valuable assistance of Captain Richard Thibault and the crew of the *R. V. INLAND SEAS* and of the University of Michigan Great Lakes Research Division, which operates the ship under sponsorship of the National Science Foundation.

The seismic equipment was provided and operated by the Geophysical and Polar Research Center, Department of Geology and Geophysics, University of Wisconsin, Madison. R. P. Meyer was in charge, aided by L. A. Powell, James Hall, and William Unger. The remainder of the scientific crew included Lineback, Gross, Susan Avcin, Matthew Avcin, Harry Leland, Joan Haley, Larry Camp, Marshall Silver, Charles Moore, Peter Feldhausen, and Bruce Bohor. Margaret Whaley coordinated ground transportation.

This research was supported in part by the University of Wisconsin's Sea Grant Program, which is a part of the National Sea Grant Program maintained by the National Oceanic and Atmospheric Administration of the U. S. Department of Commerce.

GEOLOGIC CROSS SECTIONS

Twelve east-west cross sections of the lake and one north-south cross section up the middle of the lake were drawn for this report (figs. 2, 3, 4, 5, 6). With the exception of cross section B—B', which appeared in Lineback et al. (1971), all were drawn from data gathered in 1971. Stratigraphic cores taken during the 1971 and previous cruises were related to the acoustic profiles, and the combination was used to produce the interpretative geologic cross sections. The cross sections have been arranged in north-to-south order to give a three-dimensional picture of lake floor topography and sub-bottom stratigraphy.

Cross Section A—A'

Cross section A—A' (figs. 2, 3) extends only from Milwaukee to the middle of the lake, where it meets the north-south cross section, M—M'. A—A' crosses the area of the Mid-lake High where water depths are a little less than 300 feet (91 m) (fig. 7). Near the center of the lake, the bedrock is at or near the lake floor and forms prominent topographic features (figs. 3, 7). The bedrock is mantled with till in most places, and the Lake Michigan Formation is found only in low spots on the lake floor. Along the west side of the lake, the till is thicker, and sonic penetration did not reach the bedrock.

Samples of the surface till in this area show it is a reddish brown clayey till. The Lake Michigan Formation in the center of the lake (core 861) consists mostly of the reddish gray and reddish brown clay of the South Haven and Sheboygan Members. Along the western side, however, the darker colored clays of the Waukegan, Lake Forest, and Winnetka Members are present to a depth of at least 10 feet (3 m) (core 863).

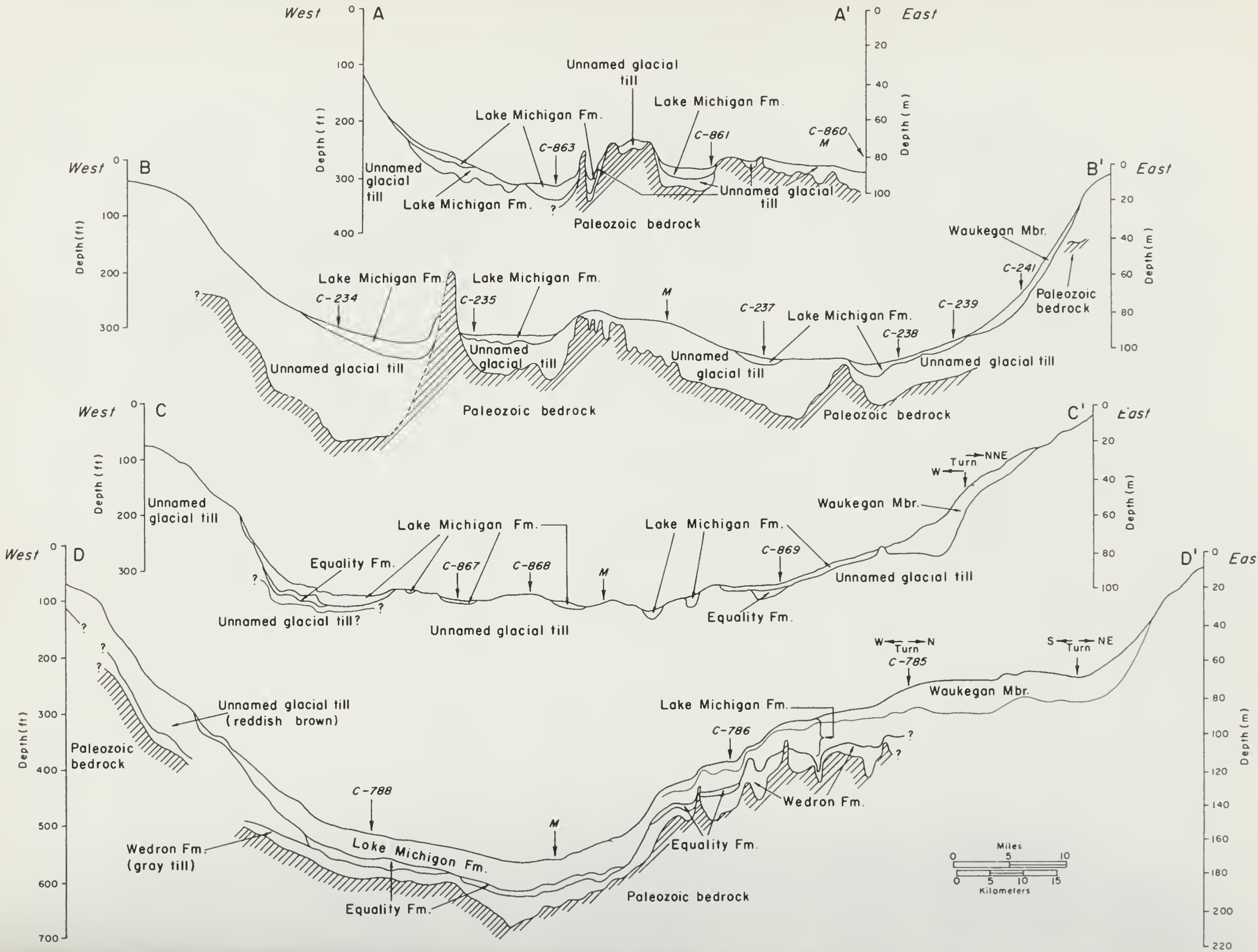

Fig. 3 - Geologic cross sections extending east-west across the northern part of southern Lake Michigan. Letter M marks intersection with the north-south cross section, M—M'.

Cross Section B—B'

Cross section B—B' extends entirely across the lake from Milwaukee to Grand Haven (fig. 2). It also crosses the Mid-lake High, and the bedrock forms prominent topographic features (figs. 3, 7). The bedrock is mantled and smoothed by reddish brown glacial till, which is very thick along the western side of the lake.

The Lake Michigan Formation is found in low spots and along the eastern shore. The Waukegan Member is up to 20 feet (6 m) thick on the slope along the eastern side of the lake and is thickest on the steep slope, thinning both upward towards shore and basinward. It is composed of recently deposited (mostly Holocene) sediment carried in by small rivers entering the lake along the Michigan shore. Core 241 penetrated nearly 10 feet (3 m) of dark silt of the Waukegan Member. The other cores along B—B' penetrated red clay of the South Haven and Sheboygan Members under only a thin cover of darker clay.

Cross Section C—C'

Cross section C—C' extends from slightly south of Milwaukee to Grand Haven (fig. 2). It crosses an area underlain by thick glacial till that is interpreted as a terminal moraine of the glacier that deposited the reddish brown till (see cross section M—M'). This area has relatively smooth lake-floor topography (fig. 3), and the till is too thick for the acoustic waves to be reflected from the bedrock.

The Lake Michigan Formation is found in low spots between till highs and consists mostly of the red clay of the South Haven and Sheboygan Members. The thick body of the Waukegan Member occurs along the eastern side of the lake.

The Equality Formation is found below the Lake Michigan Formation in places. It consists of alternating beds of glacial-lacustrine clay, silt, and clay-pebble conglomerate that give it the appearance of having many closely spaced, strong acoustic reflectors on the acoustic profiles. Thin glacial-lacustrine deposits are found in many places overlying the till where no Equality is shown on the cross section. Their acoustic properties either resemble till or they are too thin to be separated from the till. A reflecting unit within the till is present near the western end of the cross section.

Cross Section D—D'

Cross section D—D' extends from Racine to Grand Haven (fig. 2). It crosses the northern part of the closed oval basin that forms southern Lake Michigan. The water depths exceed 500 feet (152 m) in this area, about 200 feet (61 m) deeper than the waters along the Mid-lake High (fig. 3).

Most of the D—D' area is south of the moraine of the reddish brown till. The older gray till of the Wedron Formation is thin, and bedrock can be seen on the acoustic records along most of the line of cross section (fig. 3).

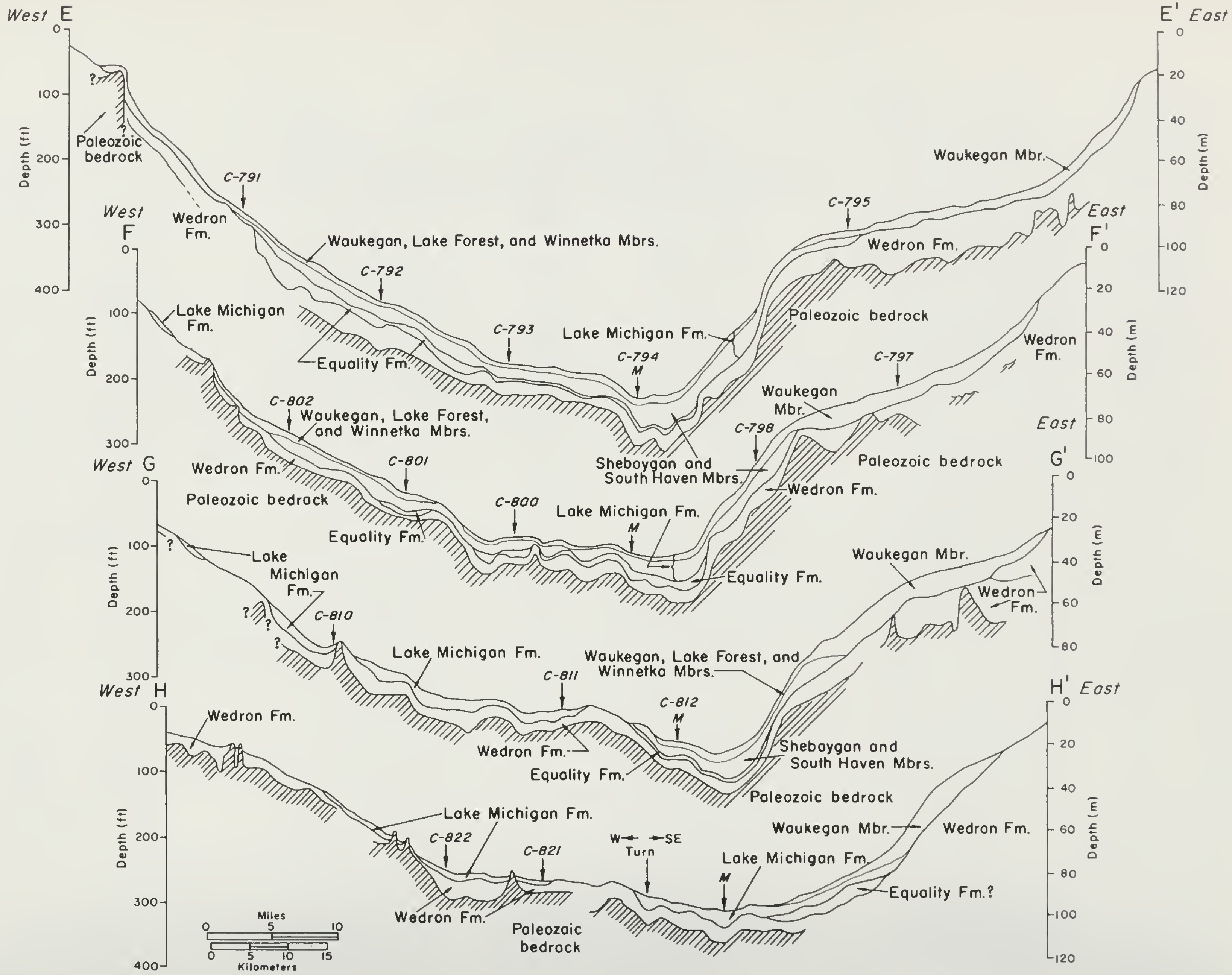

Fig. 4 - Geologic cross sections from the central part of southern Lake Michigan. Letter M marks intersections with cross section M—M'.

Cross section D—D' shows the unnamed reddish brown till present along the west side of the lake and how it pinches out (fig. 3). The underlying till is the gray till of the Wedron Formation. The Equality Formation can be recognized in several places along the cross section. The Lake Michigan Formation is more than 45 feet (15 m) thick in places near the center of the basin. Core 788 shows 11.3 feet (3.4 m) of dark clays (Waukegan, Lake Forest, and Winnetka Members) overlying the Sheboygan. The red clays of the Sheboygan and South Haven constitute the bulk of the Lake Michigan Formation in the center of the basin. The gray clays, especially the silty Waukegan Member, thicken eastward. The eastern part of the cross section extends parallel (fig. 2) to the thick wedge of Waukegan that is more than 30 feet (9 m) thick in places.

Cross Section E—E'

Cross section E—E' (fig. 4) extends from Kenosha eastward across the lake (fig. 2). Acoustic profiling revealed the bedrock underlying the lake floor almost all the way across the lake and that it controlled the topography.

Till is generally thin, except along the eastern shore, and smooths the topography. The Equality Formation is recognizable in the western part of the basin and the Lake Michigan Formation extends nearly across the lake. The South Haven and Sheboygan Members are thickest in the deepest water and pinch out farther from shore than do the overlying members. The Waukegan Member is thickest along the eastern shore.

Cross Sections F—F' and G—G'

Cross section F—F' (fig. 4) extends from north of Waukegan to South Haven (fig. 2) and cross section G—G' (fig. 5) from Waukegan to a point south of South Haven (fig. 2). They show topography and stratigraphy similar to those of cross section E—E'.

The Lake Michigan Formation thins southward. The gray clay and silt (Waukegan through Winnetka) is only a few inches thick along G—G' except in the deep water and in the wedge of Waukegan along the eastern shore of the lake. Core 810 (G—G') reached gray glacial till of the Wedron Formation.

Cross Section H—H'

Cross section H—H' (fig. 4) extends from south of Waukegan to Benton Harbor (fig. 2). Bedrock was recorded from the western shore to the deepest water, beyond which it was not reached by the acoustic profiles. Till mantles the bedrock surface. A lens of sediment of acoustic properties similar to those of the Equality Formation occurs at the base of the eastern slope. It also appears on more southerly cross sections but was not reached by coring.

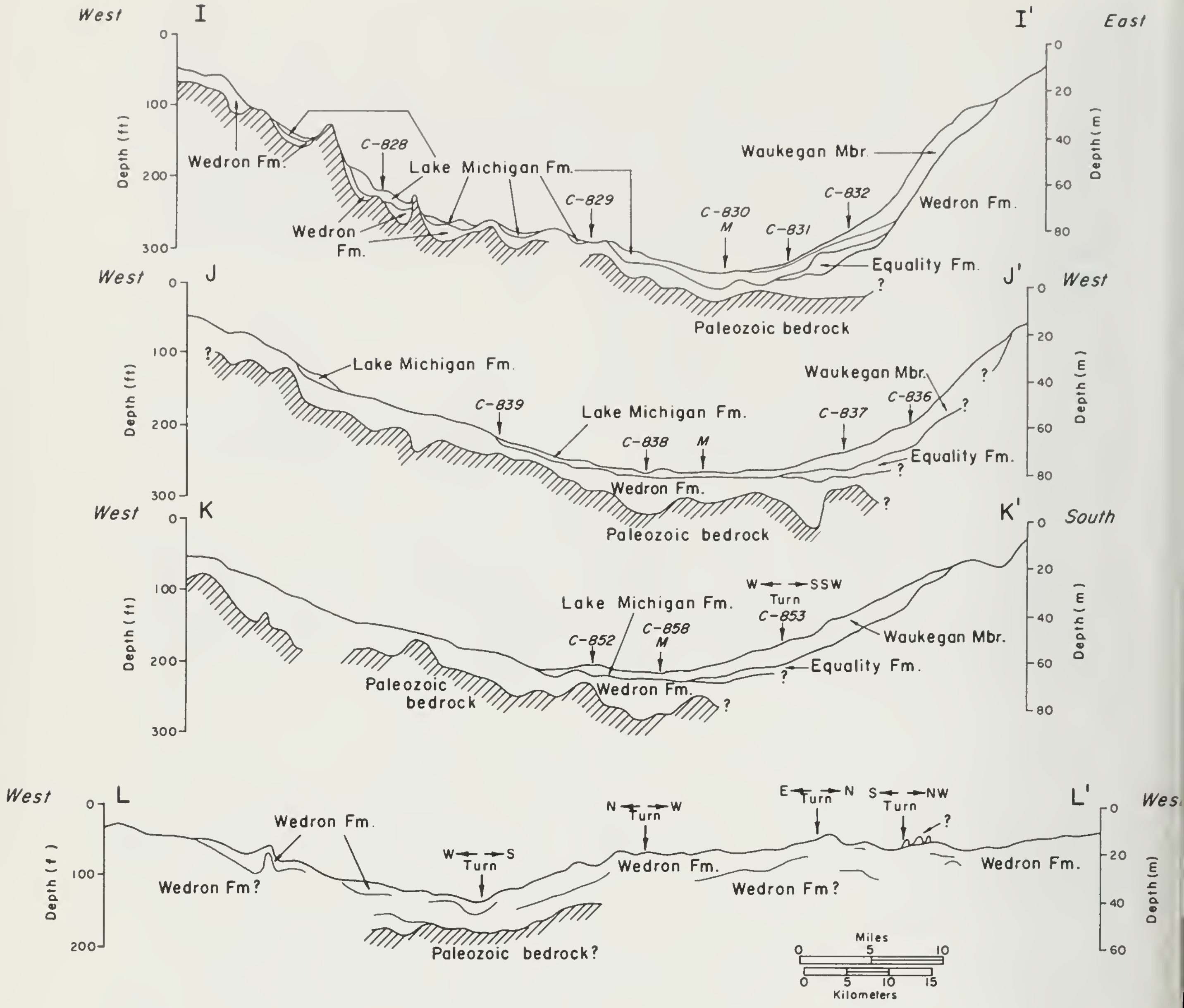

Fig. 5 - Geologic cross sections from the southern part of southern Lake Michigan. Letter M marks intersections with cross section M—M'.

The Lake Michigan Formation is not continuous because it is thin, and till and bedrock highs are present. The red clay of the South Haven and Sheboygan are overlain by only a few inches of gray clay, except along the eastern shore where the Waukegan Member is thick.

Cross Section I—I'

Cross section I—I' (fig. 5) is similar to H—H' except that it reveals more bedrock topography. The till is gray clayey till of the Wedron Formation.

The Equality Formation overlying the till is thin and could not be separated from the till on the acoustic profiles. The South Haven and Sheboygan Members are present only in the deepest water (core 830) and pinch out towards the shores. The Waukegan Member is thickest along the eastern shore.

Cross Sections J—J' and K—K'

Cross sections J—J' and K—K' are similar (fig. 5). The till cover is somewhat thicker than it is farther north and it tends to smooth the bedrock topography.

The South Haven and Sheboygan Members are not present. The Lake Michigan Formation is thickest along the eastern side of the lake, and the Waukegan Member is predominant.

Cross Section L—L'

Cross section L—L' (figs. 2, 5) contains several turns and covers an area directly east of Chicago. No Lake Michigan Formation sediments are present, and the lake floor is underlain by till. The bedrock surface was not reached by the sonic profiles in most of the area, and where it was reached it was difficult to differentiate its reflections from internal reflections in the till.

Several till units appear to be present. Deposits on the surface of the till, at the right side of the cross section, may be man-made.

Cross Section M—M'

Cross section M—M' (figs. 2, 6) extends from Michigan City northward to a point east of Milwaukee. It ties together all the other cross sections but L—L'. Northward from the southern shore of Lake Michigan, the lake floor descends uniformly into the relatively flat, central deep-water basin. The bedrock surface is rather smooth and is overlain by thin till. Bedrock, however, does not appear on seismic records in the extreme southern part of the lake. The Equality Formation is relatively thick in the center and thins southward. Glacial-lacustrine sediments correlative with the Equality Formation separate the tills that cover the southern part of the lake floor from

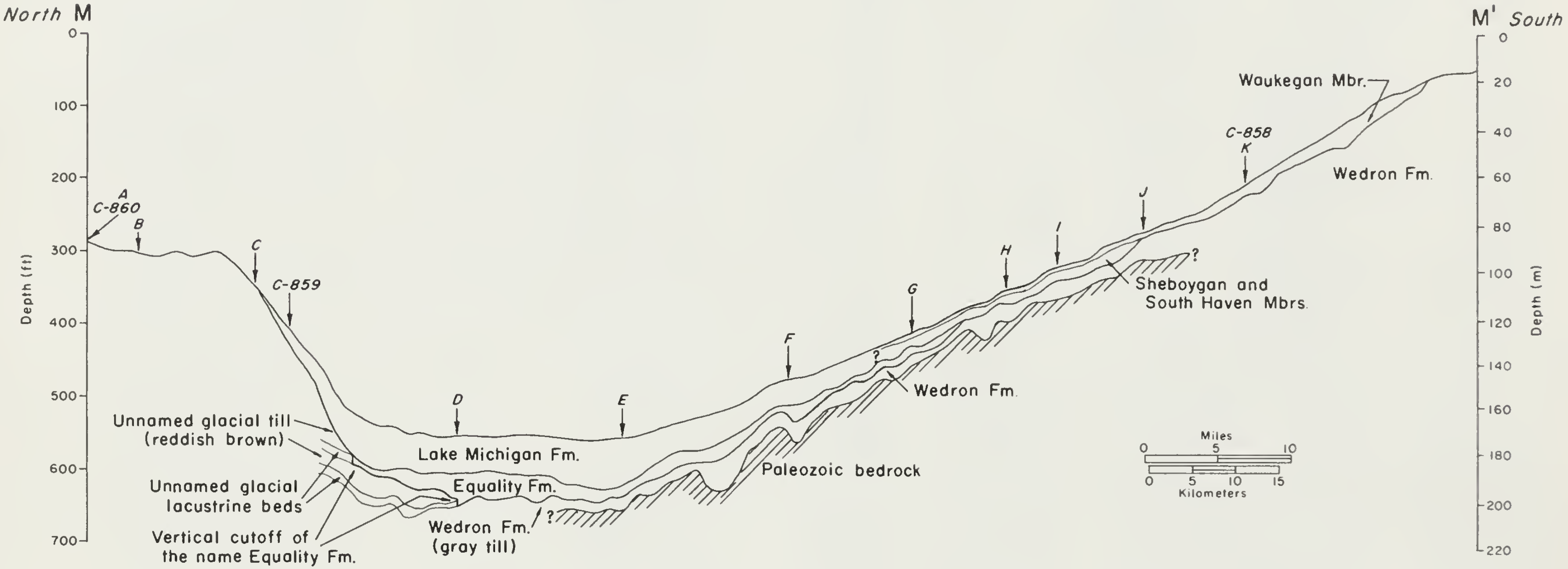

Fig. 6 - North-south geologic cross section extending northward up the center of southern Lake Michigan. Letters mark intersections with the east-west cross sections.

two overlying till units. The total till thickness increases rapidly at the northern end of the central basin and appears to represent a terminal moraine. The upper till forming the moraine is brown to reddish brown, whereas the till in the southern part of the lake is gray. Grain-size composition is similar, both tills being clayey.

The Waukegan Member is thinner off the southern shore than it is in places along the eastern shore. As the Waukegan was not found along cross section L—L', it therefore may extend only a short distance west of the line of cross section M—M'. The Sheboygan and South Haven Members pinch out southward, and the entire Lake Michigan Formation pinches out northward on the steep slope leading up to the Mid-lake High. The formation is about 60 feet (18 m) thick in the central deep-water area.

Topography

The topography of the lake floor in southern Lake Michigan is controlled by bedrock. The present configuration of the topography results from a combination of bedrock structure, differential erosion by the glaciers, and orientation of lobes of glacial ice.

The topography of the lake floor in southern Lake Michigan is characterized by a relatively rapid descent from the western shore into deep water and then a more gradual and relatively smooth descent to the center of the basin (fig. 7). In the east-central part of the basin, the lake floor rises sharply about 200 feet (61 m) along an escarpment that extends from the Mid-lake High to Benton Harbor (fig. 7). This escarpment is formed by the bedrock surface (fig. 3, D—D'), whose topography the lake floor mirrors. The topographic rise is then more gentle until the eastern shore is approached, when the rise becomes more rapid (fig. 7).

Projections of Paleozoic bedrock units under the lake indicate that this escarpment is underlain by siltstones and shales of the Coldwater Formation (Valmeyeran) rather than by the Marshall Formation (Valmeyeran) as suggested by Hough (1958). These rocks are relatively soft, although probably harder than the underlying Ellsworth and Antrim Shales (Devonian and Kinderhookian). Because they are so soft, differential erosion alone cannot explain the bedrock topography satisfactorily. Perhaps the major axis of ice movement was down the center of the basin in the area underlain by soft Devonian and Mississippian shales, and there was less movement across the area on the eastern side of the lake where the Coldwater is the underlying rock. Moraines indicate that Wisconsinan glaciers extended farther south and west of the Lake Michigan Basin than they did to the southeast, which perhaps supports this contention.

THICKNESS OF THE LAKE MICHIGAN FORMATION

Numerous stratigraphic cross sections have permitted the preparation of a map showing the thickness of the Lake Michigan Formation in more detail

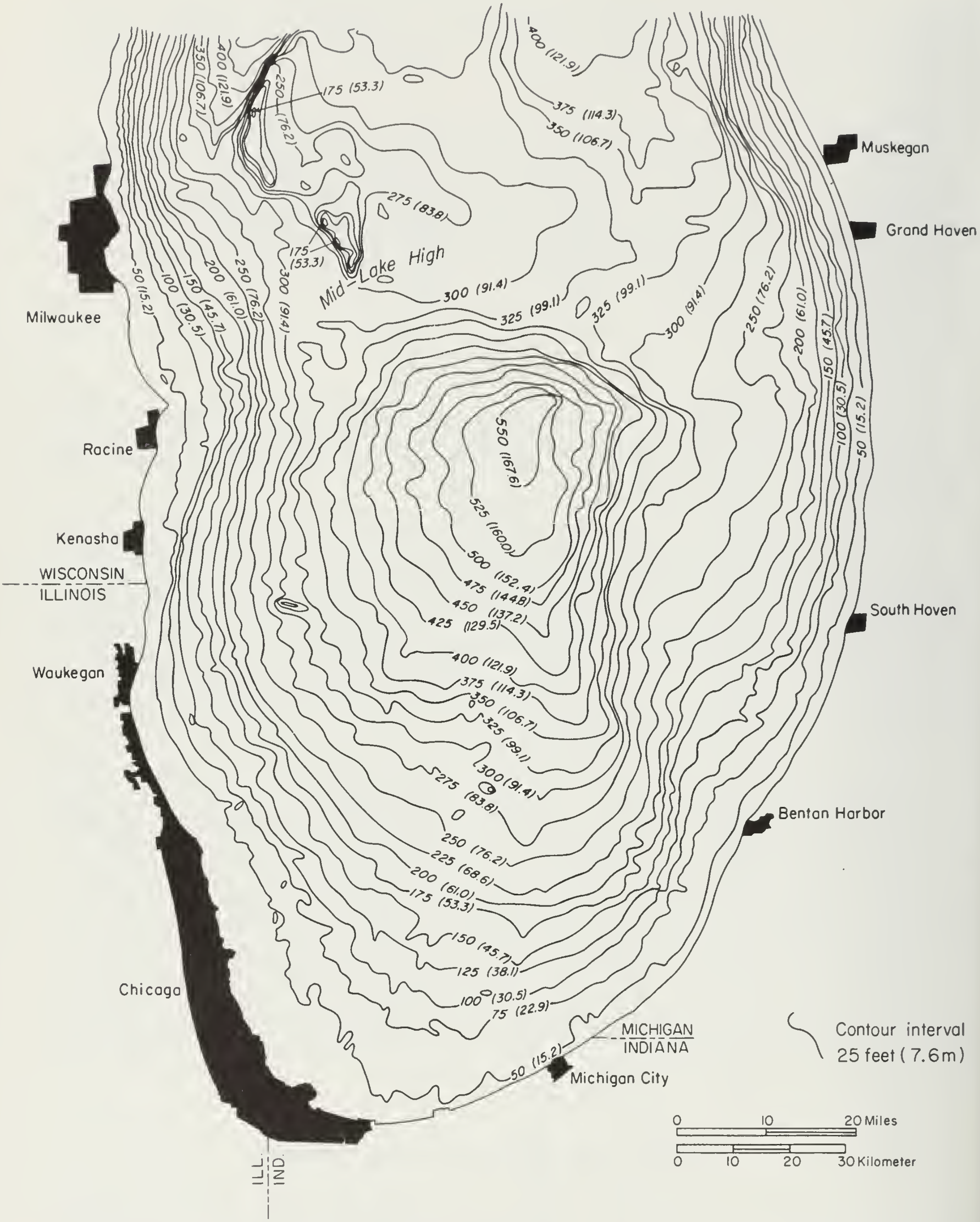

Fig. 7 - Topography of the floor of southern Lake Michigan. Contours represent depth in feet (mete below mean low-water level (576.8 feet; 174.8 m). Contouring is based on U. S. Army Corps Engineers Lake Survey District Charts. The 25-foot contour is omitted.

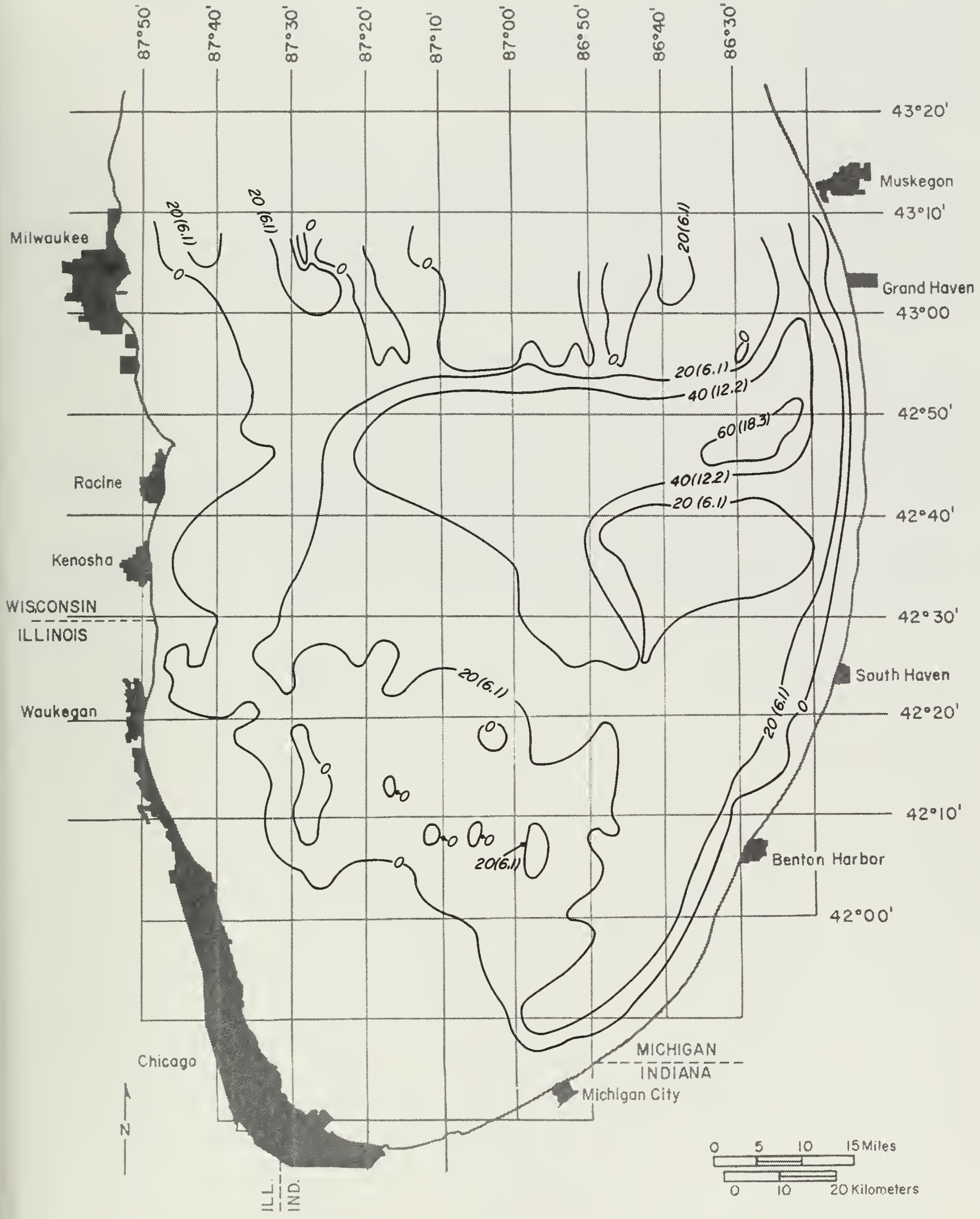

Fig. 8 - Thickness of the Lake Michigan Formation in feet (meters) in southern Lake Michigan. Contour interval 20 feet (6.1 m).

than was presented by Lineback et al. (1971). The Lake Michigan Formation is thickest (about 70 feet, 21 m) in an area southwest of Grand Haven in the northeast corner of the southern basin (fig. 8). The formation thins southwestward across the southern lake basin and is absent (or too thin to be recognized) in the area east and north of Chicago, where till and bedrock form the lake floor.

The lower part of the thick accumulation of soft sediments southwest of Grand Haven may represent deep-water, fine-grained equivalents of the Allendale delta of the glacial Grand River of Michigan (Eschman and Farrand, 1970). The glacial Grand River carried sediments westward into the ancestral Lake Michigan several times during the early stages of the Great Lakes (Hough, 1958). These deposits include coarse materials that form the Allendale delta at a high lake level south of Grand Haven. No equivalent deposits have previously been recognized on the floor of Lake Michigan.

The lower part of the Lake Michigan Formation southwest of Grand Haven is overlain unconformably by the Waukegan Member and probably also by the Lake Forest and Winnetka Members, which were deposited after the Grand River channel had ceased operation. The lower part of the sediment, therefore, is probably equivalent to the South Haven and Sheboygan Members of the Lake Michigan Formation or possibly equivalent to the Equality Formation. Unfortunately, no cores have penetrated the deeper layers in this area. Furthermore, it is not possible to trace the South Haven and Sheboygan Members directly into the area. The relation between the thick accumulation of sediment southwest of Grand Haven and deposits possibly derived from the glacial Grand River is therefore uncertain.

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APPENDIX

CORE DESCRIPTIONS

All cores described here are gravity cores, 1 7/8 inches (47 mm) in diameter, from Lake Michigan taken from the *R. V. INLAND SEAS* during September 1970 and July 1971. They are described by stratigraphic unit (fig. 1), and colors given are those of the standard Munsell notation.

CORE 201

Lat. 41°50.7'N, long. 87°09.7'W;
water depth 185 feet (56.4 m).

Pleistocene Series Lake Michigan Formation undifferentiated	Depth (cm)
1. Sand, clayey, reddish gray; irregular bedding; 5 YR 5/2	17.0
2. Clay, reddish gray; 5 YR 5/2	19.0
3. Sand, fine grained	20.0
4. Clay, brown; 7.5 YR 5/2 .	21.0
Wedron Formation **Wadsworth Member**	
5. Till, clayey, gray; rock pebbles; 10 YR 5/1	41.0

CORE 203

Lat. 42°08.1'N, long. 82°16.4'W;
water depth 232 feet (70.7 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, sandy, very dark grayish brown, mottled with lighter brown, soft; 10 YR 3/2	5.0
2. Clay, silty, dark gray, mottled with brownish gray; 10 YR 4/1	18.0
Winnetka Member	
3. Clay, brownish gray; trace of silt and sand; black beds and mottling; 10 YR 4/2	116.0
Wedron Formation **Wadsworth Member**	
4. Gravel, sandy	118.5
5. Till, silty clay, gray, stiff, plastic; trace of sand and pebbles; 5 Y 5/1 .	124.0

CORE 311

Lat. 44°27.2'N, long. 86°31.8'W;
water depth 705 feet (214.9 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, dark gray; trace of sand; faint black beds at top, becoming more prominent downward; 5 Y 4/1	105.0
2. Silt, dark olive gray; trace of sand; 5 Y 3/2 . .	117.0

3. Silt, clayey, dark gray; 5 Y 4/1	165.0

CORE 312

Lat. 44°19.0'N, long. 86°32.9'W; water depth 670 feet (204.2 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Sand, dark grayish brown; soft; 10 YR 4/2	5.0
2. Clay, brown, sandy in upper part, mottled with darker brown; 10 YR 5/3, 7.5 YR 6/4	37.5
3. Silt, reddish yellow; hard thin bed; 7.5 YR 6/6	37.6
4. Clay, gray, mottled with darker gray; 5 YR 5/1	53.0

CORE 315

Lat. 43°50.5'N, long. 86°45.2'W; water depth 466 feet (142.0 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, sandy at top, clayey in lower part, brown, mottled with lighter and darker brown; 10 YR 4/3, 6/4	24.0
2. Silt, clayey, yellowish brown; hard bed made of several thin layers; 10 YR 6/6	25.0
Lake Forest Member	
3. Clay, gray; many black beds and black mottling; fossils; 10 YR 5/1	79.5
Winnetka Member	
4. Clay, brown; black beds and mottling; 7.5 YR 5/2	182.5
Sheboygan Member	
5. Clay, reddish gray; indistinct thin beds of gray silt; 5 YR 4/2	212.8
Wilmette Bed	
6. Clay, silty, gray; black mottling; 5 Y 5/1	222.0
Sheboygan and South Haven Members undifferentiated	
7. Clay, reddish brown; indistinct bedding; 5 YR 5/4, 5/3	262.0
Equality Formation Carmi Member	
8. Clay pebble conglomerate, brown; matrix sandy, a few rock pebbles; very firm; 7.5 YR 5/2	302.0

CORE 316

Lat. 43°46.4'N, long. 86°55.8'W; water depth 571 feet (174.0 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Clay, silty, dark gray, soft; trace of black mottling in upper part; numerous faint black beds in lower part; 5 Y 4/1	153.0
Lake Forest and Winnetka Members undifferentiated	
2. Clay, grayish brown; many closely spaced black beds; core partially dried and oxidized; 10 YR 5/2	261.0

CORE 317

Lat. 43°40.0'N, long. 86°48.5'W;
water depth 408 feet (124.4 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, sandy, dark brown mottled with darker brown; 10 YR 3/2, 4/3 . . .	4.0
2. Silt, clayey, dark gray; numerous faint black beds and black mottling; 5 Y 4/1 . .	105.0
Lake Forest and Winnetka Members undifferentiated	
3. Clay, gray; black beds and mottling; fossils; 10 YR 5/1	228.0
4. Sand, clayey, gray; fossils; 10 YR 5/1	229.8
Sheboygan Member	
5. Clay, reddish gray; brown mottling; 5 YR 5/2	262.3
Wilmette Bed	
6. Clay, dark gray; black beds and mottling; 5 Y 4/1	285.0
7. Clay, reddish brown; bands of reddish gray; 5 YR 5/4 .	322.0

CORE 318

Lat. 43°33.0'N, long. 86°42.4'W;
water depth 320 feet (97.5 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Clay, silty, black, soft; 5 Y 2/1	6.0
2. Clay, silty, dark gray; faint black beds and mottling; 5 Y 4/1	182.0

CORE 326

Lat. 42°56.8'N, long. 86°23.2'W;
water depth 219 feet (66.8 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, clayey, black; trace of sand; 5 Y 2/1 . .	3.5
2. Clay, silty, dark gray; trace of sand; faint black beds and mottling; 5 Y 4/1	340.0

CORE 327

Lat. 42°52.5'N, long. 86°23.2'W;
water depth 215 feet (65.5 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Clay, silty, dark gray; faint black beds and black mottling; several cm lost from top; 5 Y 4/1	334.0

CORE 328

Lat. 42°48.1'N, long. 86°23.2'W;
water depth 215 feet (65.5 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, clayey, black, soft; 5 Y 2/1	8.0
2. Clay, silty, dark gray, soft; trace of sand; faint black beds and mottling; 5 Y 4/1	179.0

CORE 333

Lat. 42°37.3'N, long. 86°21.4'W; water depth 180 feet (54.9 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, black, sandy, very soft and fluid; 5 Y 2/1	5.0
2. Silt, clayey, dark gray, soft; trace of sand; faint black beds and mottling; wood fragments; becomes more clayey downward; 5 Y 4/1	266.0

CORE 334

Lat. 42°33.0'N, long. 86°31.9'W; water depth 250 feet (76.2 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, very dark gray, very soft; trace of sand; faint black mottling; 5 Y 3/1	47.0
2. Clay, silty, dark gray; trace of sand; faint black beds and mottling; 5 Y 4/1	222.0
Lake Forest Member	
3. Clay, gray; many black beds and much black mottling; trace of sand; 10 YR 5/1	343.5

CORE 340

Lat. 42°22.8'N, long. 86°29.0'W; water depth 162 feet (49.4 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, clayey, black; 5 Y 2/1	1.0
2. Clay, silty, dark gray; faint bedding; trace of sand; 5 Y 4/1	92.0
3. Clay, silty, dark gray; trace of sand; faint black beds and mottling; 5 Y 4/1	339.0

CORE 341

Lat. 42°22.2'N, long. 86°35.2'W; water depth 165 feet (50.3 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, dark gray, very soft; trace of sand; trace of black mottling; possibly some sediment lost at top; 5 Y 4/1	70.0
2. Clay, silty, dark gray; trace of sand; firmer than above; faint black beds and mottling; 5 Y 4/1	335.0

CORE 342

Lat. 42°21.4'N, long. 86°41.6'W; water depth 243 feet (74.1 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, clayey, dark gray, very soft; 5 Y 4/1	70.0
2. Clay, silty, dark gray; faint black beds and mottling; 5 Y 4/1	333.0

CORE 343

Lat. 42°20.5'N, long. 86°51.6'W; water depth 397 feet (121.0 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Clay, silty, dark gray; faint black beds and mottling; 5 Y 4/1 . . . . 155.0

Lake Forest Member

2. Clay, gray; faint closely spaced black beds and black mottling; 10 YR 5/1 . . . . . . 277.0

Winnetka Member

3. Clay, grayish brown; faint black beds and mottling; 10 YR 5/2 . . . 345.0

CORE 344

Lat. 42°13.8'N, long. 87°02.4'W; water depth 324 feet (98.8 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Clay, silty, brown; trace of sand; mottled with gray; fossils; sandy at contact with unit below; 10 YR 5/3 . . 6.5

South Haven Member

2. Clay, reddish brown; gray beds in lower part; faint dark brown mottling in upper part; 5 YR 5/3, 5/4. 81.0

Equality Formation
Carmi Member

3. Clay, brown; clay pebbles; 7.5 YR 5/2 . . . . . . 90.0
4. Clay, grayish brown, firm, thinly laminated; 10 YR 5/2 . . . . 99.5
5. Clay, as above; beds dip steeply 109.0
6. Clay pebble conglomerate; trace of sand and rock pebbles in matrix; 7.5 YR 5/2 . . . . 112.0
7. Clay, gray, firm; trace of sand and clay pebbles; 10 YR 5/1 . . . . 160.0
8. Clay pebble conglomerate, brown; sand and rock fragments in matrix; 7.5 YR 5/2 . . . . 167.0
9. Clay, same as 7 . . . . 170.0
10. Clay pebble conglomerate, same as 8 . . . . 186.0
11. Clay, same as 7 . . . . 188.0
12. Clay pebble conglomerate, same as 8 . . . . 206.0
13. Clay, same as 7 . . . . 211.0
14. Clay, silty, gray, firm; sand and rock fragments; 10 YR 5/1 . . . . 216.0
15. Clay, same as 7 . . . . 248.0
16. Clay pebble conglomerate; same as 8 . . . . 268.0
17. Clay, same as 7 . . . . 292.0

CORE 367

Lat. 42°26.6'N, long. 87°26.4'W; water depth 321 feet (97.8 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Clay, silty, dark grayish brown, mottled with lighter gray; 10 YR 4/2 . . . 13.0

Lake Forest Member

2. Clay, gray; black beds and mottling; 10 YR 5/1 . . . . 67.0

Winnetka Member

3. Clay, brown; black mottling; trace of sand and shells; 7.5 YR 5/2 . . . . 87.0

Sheboygan Member

4. Clay, reddish gray; thin beds of gray silt; 5 YR 5/2, 5/3 . . . . 156.0

Wilmette Bed

5. Clay, dark gray; black mottling; 5 Y 4/1 . . . . 168.0

6. Clay, reddish brown; orangish brown zones 178-181, 190-196, 208-212; 5 YR 5/3 . . . . 215.0

South Haven Member

7. Clay, reddish gray; bedding fainter than in overlying unit; 5 YR 5/2 . . . 378.0

CORE 369

Lat. 42°36.4'N, long. 87°11.8'W; water depth 480 feet (146.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, very dark gray, soft; black mottling; 5 Y 3/1 . . . . 44.0

Lake Forest Member

2. Clay, gray; many prominent black beds; 10 YR 5/1 . . . 131.0

Winnetka Member

3. Clay, grayish brown; a few black beds and mottling; 10 YR 5/2 . . . . . 262.0

Sheboygan Member

4. Clay, brown; indistinct bedding; 7.5 YR 5/2 . . . . 299.0

Wilmette Bed

5. Clay, dark gray; black bed at top; mottling of black and lighter gray clay; 5 Y 4/1 . . . . . 310.0

6. Clay, alternating bands of reddish brown and and reddish gray; 5 YR 5/3 . . . . 368.0

South Haven Member

7. Clay, reddish gray, uniform; 5 YR 5/2 . . . . 555.2

CORE 370

Lat. 42°42.9'N, long. 87°10.2'W; water depth 491 feet (149.7 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, dark gray, soft; faint black beds; 5 Y 4/1 . . . . 39.0

Lake Forest Member

2. Clay, gray; prominent black beds and mottling; 5 Y 5/1 . . . . 130.0

Winnetka Member

3. Clay, gray; faint black beds; 10 YR 5/1 . . . . 200.0

Sheboygan Member

4. Clay, reddish brown; trace of black beds and mottling; 5 YR 5/3 . . . . 293.0

Wilmette Bed

5. Clay, dark gray; mottlings of black and light gray clay; 5 Y 4/1 . . . . 305.3

6. Clay, alternating beds of reddish brown and orangish brown; 5 YR 5/3 . . . . 342.0

South Haven Member

7. Clay, reddish brown; faint irregular bedding; 5 YR 5/2 . . . . 433.0

CORE 371

Lat. 42°49.3'N, long. 87°09.0'W; water depth 481 feet (146.6 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, dark gray, soft; black mottling in upper half, black beds in lower half; 5 Y 4/1 . . 88.0

Lake Forest Member

2. Clay, gray; black beds; 5 Y 5/1 to 10 YR 5/1 . . . 156.0

Winnetka Member

3. Clay, light brownish gray; faint bedding; 10 YR 6/2 . 201.0

Sheboygan Member

4. Clay, reddish brown; faint bedding and black mottling; 5 YR 5/3 . . . . 244.0

Wilmette Bed

5. Clay, dark gray; faint bedding; mottled with lighter gray clay; 5 Y 4/1 . . . . 252.0

6. Clay, reddish brown; beds of orangish brown clay; 5 YR 5/3, 5/4 . . . . 287.0

CORE 372

Lat. 42°51.8'N, long. 87°18.0'W; water depth 398 feet (121.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, dark grayish brown, soft; 10 YR 4/2 . . . . . 2.0

2. Silt, dark brown; thin hard bed; 7.5 YR 4/4 . . . 2.2

3. Silt, gray, soft; 10 YR 5/1 . . . . 6.5

4. Clay, silty, light gray, mottled with lighter gray; faint bedding; 10 YR 6/1 . 16.5

Lake Forest Member

5. Clay, light gray; black beds and mottling; base sharp; 10 YR 6/1 . . . . . 66.0

Sheboygan Member

6. Clay, pinkish gray; black mottling; a few faint black beds; 7.5 YR 6/2, 5/2 . . . . . 189.0

Wilmette Bed

7. Clay, dark gray, mottled with black and lighter gray; 5 Y 4/1 . . . . 204.0

8. Clay, reddish brown; irregular beds; 5 YR 5/4 . . . . 264.0

South Haven Member

9. Clay, reddish brown; more homogeneous than above; faint bedding; 5 YR 5/3 . . 320.0

CORE 373

Lat. 42°55.5'N, long. 87°31.0'W; water depth 295 feet (89.9 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, silty, brown; 7.5 YR 5/4 . . . . 2.0

2. Clay, brown; thin hard beds of yellow-brown silt; 7.5 YR 5/4 . . 19.5

Sheboygan and South Haven Members undifferentiated

3. Clay, pinkish gray; thin beds of gray silt; 7.5 YR 6/2 . . . . . 233.0

CORE 382

Lat. 42°55.5'N, long. 87°19.7'W; water depth 325 feet (99.1 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, dark yellowish brown mottled with lighter and darker brown; 10 YR 4/4 . . . . 4.0

2. Clay, brown, mottled with lighter brown; hard silt bed at 7 cm; fossils; 10 YR 5/3 . . . . 29.0

Sheboygan Member

3. Clay, reddish gray; faint bedding; a few black beds; 5 YR 5/2 . . . . 129.0

Wilmette Bed

4. Clay, dark gray; black beds at top; black mottling; 5 Y 4/1 . . . . 144.0

5. Clay, reddish brown; trace of black mottling; beds of more reddish clay; 5 YR 5/3 . . . . 178.0

South Haven Member

6. Clay, reddish gray; faint bedding; sand bed at 276 cm; 5 YR 5/2 . . . . 293.0

CORE 383

Lat. 42°51.0'N, long. 87°07.2'W; water depth 465 feet (141.7 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, dark gray, very soft; may have lost some sediment from top; 5 Y 4/1 . . . . 58.0

2. Silt, clayey, very dark gray; faint black beds; 5 Y 4/1 . . . . 122.0

Lake Forest Member

3. Clay, gray; faint, closely spaced black beds and mottling; description of 169-365 cm from shipboard description; segment missing; 5 Y 5/1 . . . . . 175.0

Winnetka Member

4. Clay, brownish gray; black beds 333.0

Sheboygan Member (?)

5. Clay, brownish gray . . . 365.0

CORE 384

Lat. 42°51.8'N, long. 87°02.5'W; water depth 470 feet (143.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, black, very soft and fluid; 5 Y 2/1 . . . . 6.0

2. Silt, dark gray, very soft; 5 Y 4/1 . . . . 15.0

3. Clay, silty, gray; faint, thin black beds; 5 Y 5/1 . . . . . . 340.0

Sheboygan Member

2. Clay, reddish brown, mottled with lighter brownish gray; alternating beds of reddish brown and brown; 5 YR 5/3, 5/4 . . . . 65.0

South Haven Member

3. Clay, reddish gray; faint bedding; 5 YR 5/2 . . . . 123.0

Equality Formation
Carmi Member

4. Silt, pinkish gray; very firm; 7.5 YR 6/2 . . . . . 128.0

5. Clay, silty, brown; clay pebbles; 7.5 YR 5/2 . . . . 145.0

6. Silt, grayish brown; 10 YR 5/2 . . . . 150.0

7. Clay, silty, brown; faint bedding; a few clay pebbles; 7.5 YR 5/2 . . . . 167.0

8. Silt, grayish brown; clay pebbles; faint bedding; 10 YR 5/2 . . . . 179.0

Unnamed till formation

9. Clay pebble conglomerate grading downward into till; brown; 7.5 YR 5/2 . . . . 220.0

CORE 385

Lat. 42°38.7'N, long. 86°34.3'W; water depth 365 feet (111.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Clay, sandy, reddish brown; beds of sand and shells; 5 YR 5/3 . . . . . 2.0

CORE 386

Lat. 42°56.5'N, long. 86°33.5'W; water depth 300 feet (91.4 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, black; trace of sand; trace of black mottling; 5 Y 2/1 . . . . 12.5

2. Silt, clayey, dark gray; black beds and mottling; 5 Y 4/1 . . . . 69.0

Lake Forest Member

3. Clay, gray; black beds and mottling; fossils; 10 YR 5/1 . . . . 158.0

4. Sand, coarse; large bivalve and gastropod shells; becomes finer and more clayey upward 163.0

South Haven Member

5. Clay, reddish gray; faint bedding; 5 YR 5/2 . . . . 233.0

Unnamed till formation

6. Till, clayey, grayish brown, hard; trace of sand; rock fragments; 10 YR 5/2 . . . . 235.0

CORE 779

Lat. 43°04.7'N, long. 86°28.8'W;
water depth 232 feet (70.7 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, dark gray, soft; trace of sand; trace of black mottling; 5 Y 4/1 . . . . . . 139.0

2. Silt, clayey, dark gray; faint black beds and mottling; 5 Y 4/1 . . . . 240.0

3. Silt, very clayey, gray; a few fossils; faint black beds; 5 Y 5/1 . . . . 458.0

CORE 780

Lat. 43°04.7'N, long. 86°29.8'W;
water depth 297 feet (90.5 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, clayey, brown, mottled with lighter and darker brown; hard, dark brown, silt bed 2 mm thick at base; 10 YR 4/3 . . . . 14.7

Lake Forest Member

2. Clay, sandy, gray; black mottling; a few fossils; 10 YR 5/1 . . . . 71.0

3. Sand, clayey, grayish brown; fossils; 10 YR 5/3 . . . . 75.5

South Haven Member

4. Clay, reddish brown; very faint bedding; beds of gray silt in lower part; 5 YR 5/3 . . . 120.0

Equality Formation
Carmi Member

5. Clay, silty, brown, hard, firm; trace of sand and pebbles; bedding distorted; 7.5 YR 5/2 . . . . 160.0

6. Clay, reddish brown; 5 YR 5/3 . . . . 162.0

7. Clay, silty, grayish brown; bedding distorted; trace of sand and pebbles; 10 YR 5/2 . . . . 208.0

Unnamed till formation

8. Till, clayey, brown; trace of silt, sand, and pebbles; 7.5 YR 5/2 . . . . 212.0

CORE 781

Lat. 43°01.2'N, long. 86°26.1'W;
water depth 265 feet (80.7 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Sand, silty and clayey, dark gray to brownish gray; hard silt beds in lower part; 5 Y 4/1, 10 YR 4/2	10.0
2. Silt, clayey, gray; trace of sand; black beds and mottling; fossils; 5 Y 5/1	41.8
3. Clay, silty, gray; trace of sand; faint black beds and mottling; fossils; 5 Y 5/1	97.2
4. Sand, coarse, gray; fossils; trace of silt and clay; 5 Y 5/1	101.6

CORE 785

Lat. 42°45.0'N, long. 86°23.0'W;
water depth 227 feet (99.2 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, clayey, black, very soft and water saturated; 5 Y 2/1	16.0
2. Silt, clayey, dark gray; faint black beds and black mottling; 5 Y 4/1	261.0

CORE 786

Lat. 43°04.7'N, long. 86°29.8'W;
water depth 297 feet (90.5 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, clayey, dark gray, soft at top but becoming firmer downward; trace of sand; faint black beds and mottling in lower part; 5 Y 4/1	224.0
Waukegan and Lake Forest Members undifferentiated	
2. Clay, silty, dark gray; trace of black mottling; 5 Y 4/1	237.0

CORE 788

Lat. 42°45.0'N, long. 87°18.0'W;
water depth 487 feet (148.4 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, dark gray, soft at top; trace of sand and clay; becomes clayey downward; faint black beds and mottling; 5 Y 4/1	124.0
Lake Forest Member	
1. Clay, silty, gray; prominent black beds; black mottling; 5 Y 5/1	229.0
Winnetka Member	
3. Clay, gray; faint black beds; black mottling; 10 YR 5/1.	339.0

Sheboygan Member

4. Clay, brown in upper part to reddish gray in lower part; trace of black mottling; 7.5 YR 5/2 to 5 YR 5/2 . . . . 405.0

CORE 791

Lat. 42°35.0'N, long. 87°32.8'W; water depth 270 feet (82.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, brown, mottled with lighter brown; some clay; several beds of hard yellow-brown silt 1 mm thick; 7.5 YR 5/2 . . . . 31.0

Winnetka Member

2. Clay, brown; trace of silt and sand; trace of black mottling; fossils; sandy in lower 5 cm; 7.5 YR 5/2 . . . . . 78.0

South Haven Member

3. Clay, reddish brown; faint bedding; a few pebbles; trace of black mottling; 5 YR 5/4 . . . . 256.0

Equality Formation
Carmi Member

4. Clay, brown, firm, sticky, plastic; trace of sand, silt, and pebbles; faint bedding; 7.5 YR 5/2 . . . . 287.5

CORE 792

Lat. 42°35.0'N, long. 87°21.0'W; water depth 391 feet (119.2 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, black, fluid; 5 Y 2/1 . . . . . . 8.0

2. Silt, clayey, gray, soft; black beds and mottling; 5 Y 4/1 . . . . . 94.0

Lake Forest Member

3. Clay, silty, gray; prominent black beds and mottling; 5 Y 5/1 . . . . . . 123.0

Winnetka Member

4. Clay, gray to brownish gray; black beds and mottling; fossils; 10 YR 5/1, 5/2 . . . . 215.0

Sheboygan Member

5. Clay, brown to reddish brown; trace of black mottling; 7.5 YR 5/2, 5 YR 5/2 . . . . 291.0

Wilmette Bed

6. Clay, dark gray; black mottling; 5 Y 4/1 . . . 303.0

7. Clay, gray; trace of black mottling; a few fossils; 5 YR 5/1 . . . . . 308.0

CORE 793

Lat. 42°35.0'N, long. 87°09.5'W; water depth 486 feet (148.1 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, dark gray, very soft; trace of black mottling; a few fossils; 5 Y 4/1	19.0
Lake Forest Member	
2. Clay, silty, gray; prominent black beds; a few fossils; 5 Y 5/1	96.5
Winnetka Member	
3. Clay, gray; black beds and mottling, fainter than in unit 2; 10 YR 5/1	174.0
4. Clay, brown; faint black beds in upper part, black mottling in lower part; 7.5 YR 5/2	247.0
Sheboygan Member	
5. Clay, reddish gray; trace of black mottling; 5 YR 5/2	284.5
Wilmette Bed	
6. Clay, gray; black and lighter gray mottling; 5 Y 5/1	295.0
7. Clay, reddish gray, alternating with grayish brown beds; faint bedding; 5 YR 5/2, 10 YR 5/2, 5/3	334.0
South Haven Member	
8. Clay, reddish gray, uniform; very faint bedding; 5 YR 5/2	463.5

CORE 794

Lat. 42°35.0'N, long. 86°57.0'W;
water depth 532 feet (162.2 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, very dark gray, very soft; trace of sand; 5 Y 3/1	66.5
2. Silt, clayey, very dark gray, soft; trace of sand; black mottling and a few black beds; 5 Y 3/1	116.0
Lake Forest Member	
3. Clay, silty, gray; black beds and mottling; 5 Y 5/1	181.2
Winnetka Member	
4. Clay, gray; closely spaced black beds; 10 YR 5/1	225.0
Winnetka and Sheboygan Members undifferentiated	
5. Clay, brown; trace of black mottling; 7.5 YR 5/2	257.0

CORE 795

Lat. 42°35.0'N, long. 86°40.0'W;
water depth 290 feet (88.4 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, sandy, very dark gray, very soft; trace of black mottling; 5 Y 3/1	11.0
2. Silt, clayey, dark gray; trace of sand; black beds and mottling; 5 Y 4/1	33.5

Lake Forest Member

3. Clay, gray; trace of silt; black beds and mottling; a few fossils; 10 YR 5/1 . . . . 151.0

Winnetka Member

4. Clay, grayish brown; faint, closely spaced bedding; 10 YR 5/2 . . . . 160.0

5. Clay, brown; many thin beds of gray silt; 7.5 YR 5/2 . . . . . . 206.0

Sheboygan Member

6. Clay, brown, with some reddish brown; faint bedding; trace of black mottling; 7.5 YR 5/2 . . . . 220.0

Wilmette Bed

7. Clay, dark gray; black mottling; 5 Y 4/1 . . . . 225.0

8. Clay, dark reddish gray; 5 YR 4/2 . . . . 229.5

CORE 797

Lat. 42°25.0'N, long. 86°34.0'W; water depth 206 feet (62.8 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, dark gray, very soft and fluid; 5 Y 4/1 . . 8.0

2. Silt, clayey, dark gray; trace of sand; faint bedding; 5 Y 4/1 . . . . 121.0

3. Silt, clayey; grades downward into silty clay; trace of black mottling and a few faint black beds; 5 Y 4/1 . . . . 237.0

CORE 798

Lat. 42°25.0'N, long. 86°45.8'W; water depth 309 feet (94.2 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, dark gray, soft, fluid; 5 Y 4/1 . . . . 10.0

2. Clay, silty, dark gray, soft; no visible bedding; 5 Y 4/1 . . . . 68.0

3. Clay, dark gray; trace of black mottling; faint black beds; 5 Y 4/1 . . . . 143.0

Lake Forest Member

4. Clay, gray; many closely spaced faint black beds; a few fossils; 10 YR 5/1. . 277.0

CORE 800

Lat. 42°25.0'N, long. 87°09.3'W; water depth 423 feet (128.9 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, dark gray, soft; faint black beds; 5 Y 4/1 . . . . 12.5

Lake Forest Member

2. Clay, gray; prominent black beds and mottling; sharp base; 10 YR 5/1 . . . 74.5

Winnetka Member

3. Clay, grayish brown to brown; black beds becoming fainter at base; 10 YR 5/2, 7.5 YR 5/2 . . . 128.0

Sheboygan Member

4. Clay, brown; faint bedding; trace of black mottling; 7.5 YR 5/2 . . . . 202.0

Wilmette Bed

5. Clay, dark gray, mottled with lighter and darker gray; heavy black mottling in top 1 cm, trace in remainder; 5 Y 4/1 . 213.0

6. Clay, reddish gray alternating with reddish brown; 5 YR 5/2, 5/3, 5/4 . . . . 251.0

South Haven Member

7. Clay, reddish brown to reddish gray; faint bedding except in lower 25 cm where irregular bedding is present; 5 YR 5/3, 5/2 . . . . 430.0

Equality Formation
Carmi Member

8. Clay, grayish brown; faint bedding; small clay pebbles; harder and firmer than South Haven Member; 10 YR 5/2 . . . . 444.0

CORE 801

Lat. 42°25.0'N, long. 87°20.0'W;
water depth 358 feet (109.1 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, dark yellow brown; 10 YR 3/4 . . . . 1.0

2. Silt, clayey, dark gray; trace of sand; trace of black mottling and faint black beds; 5 Y 4/1 . . . . 54.0

3. Clay, silty, dark gray; black beds; 5 Y 4/1 . . . . 68.5

Lake Forest Member

4. Clay, gray; black beds and mottling; 10 YR 5/1 . . . . 120.0

Winnetka Member

5. Clay, grayish brown; black beds and mottling; a few fossils; 10 YR 5/2 . . . . 148.2

Sheboygan Member

6. Clay, reddish gray to dark gray; trace of black mottling; 5 YR 4/1, 5/2 . . . . 177.0

Wilmette Bed

7. Clay, dark gray; black mottling at top; mottled with lighter gray; 5 Y 4/1 . . . . 184.0

8. Clay, reddish brown to reddish gray; irregular alternating beds; trace of black mottling; 5 YR 5/4 to 5/2 . . . . 213.5

CORE 802

Lat. 42°25.0'N, long. 87°32.8'W; water depth 268 feet (81.7 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, silty, dark brown; 10 YR 4/3 . . . . . 1.0

2. Silt, clayey, dark gray to brownish gray; trace of sand; hard, thin silt beds; 10 YR 4/1, 4/2 . . . . 9.5

Lake Forest Member

3. Clay, gray; black beds and mottling; 10 YR 5/1 . . . . 88.0

Winnetka Member

4. Clay, brown; faint black beds and mottling; 7.5 YR 5/2 . . . . 110.0

Sheboygan Member

5. Clay, brown; trace of sand; very faint black mottling; 7.5 YR 5/2 . . . . 174.0

Wilmette Bed

6. Clay, dark gray; black mottling; 5 Y 4/1 . . . 191.0

7. Clay, alternating reddish brown and reddish gray beds; 5 YR 5/2, 5/3, 4/3 . . . . 220.0

South Haven Member

8. Clay, reddish gray; closely spaced beds of gray silt; 5 YR 5/2 . . . . 247.5

Fault

Sheboygan Member

9. Clay, reddish brown to brown; trace of black mottling; 5 YR 5/3; 7.5 YR 5/2 . . . . 264.0

Wilmette Bed

10. Clay, dark gray; black mottling; 5 Y 4/1 . . . . 272.0

11. Clay, reddish brown alternating with beds of more orangish brown clay; 5 YR 5/3, 4/3 . . . . 291.0

South Haven Member (?)

12. Clay, brown; 7.5 YR 5/2 . . . . 302.0

CORE 810

Lat. 42°17.6'N, long. 87°29.0'W; water depth 251 feet (76.5 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
undifferentiated

1. Sand, silty, brown; some clay; 10 YR 4/3, 7.5 YR 5/2 . . . . 6.5

2. Clay, sandy, brown; irregular beds of sand and shells; 10 YR 4/3 . . . . 15.0

Wedron Formation
Wadsworth Member

3. Till, clayey, grayish brown, firm; trace of sand and silt; a few pebbles; 2.5 Y 5/2	20.0

CORE 811

Lat. 42°17.6'N, long. 87°07.0'W; water depth 240 feet (73.2 m).

Pleistocene Series	Depth (cm)
Lake Michigan Formation	
Waukegan Member	
1. Silt, sandy, dark grayish brown, very soft, fluid; 10 YR 4/2	1.0
2. Clay, silty, brown; trace of sand; mottled with dark gray; thin beds of hard silt; 10 YR 5/3, 5/2	16.0
Lake Forest and Winnetka Members undifferentiated	
3. Clay, gray; black beds and mottling; 10 YR 5/1	54.0
4. Sand, clayey, brown; fossils; 7.5 YR 5/2	56.0
Sheboygan Member	
5. Clay, reddish gray; black mottling; sharp contact with sand; 5 YR 5/2	60.0
Wilmette Bed	
6. Clay, dark gray; black mottling; a few faint black beds; mottlings of lighter gray; 5 Y 4/1	72.8
7. Clay, reddish brown alternating with reddish gray; 5 YR 5/4, 5/3, 5/2	101.5
South Haven Member	
8. Clay, reddish brown; faint, irregular bedding; 5 YR 5/3	169.5
9. Clay, reddish gray to brown; a few black beds and mottling; 7.5 YR 5/2; 5 YR 5/3, 4/3, 5/2	270.0
Equality Formation	
Carmi Member	
10. Clay pebble conglomerate; matrix sandy, grayish brown; 10 YR 5/2	279.0

CORE 812

Lat. 42°17.6'N, long. 86°57.5'W; water depth 387 feet (118.0 m).

Pleistocene Series	Depth (cm)
Lake Michigan Formation	
Waukegan Member	
1. Silt, clayey, very dark gray; trace of sand; a little black mottling and some black beds; thin, hard beds of yellow-brown silt between 1 and 2 cm; 5 Y 3/1	58.0

CORE 821

Lat. 42°12.8'N, long. 87°13.2'W; water depth 257 feet (78.3 m).

Pleistocene Series	Depth (cm)
Lake Michigan Formation	
Waukegan Member	
1. Silt, dark grayish brown, mottled with light and dark gray; some clay and sand; several thin, hard beds of yellowish brown silt; 10 YR 4/2, 5/2	13.5

Lake Forest and Winnetka Members undifferentiated

2. Clay, silty, grayish brown; trace of sand; black beds and mottling; fossils; 10 YR 5/2 . . . . 58.0

3. Sand and some pebbles; grayish brown; fossils; 10 YR 5/2 . . . . 61.2

South Haven Member

4. Clay, reddish brown; faint bedding; 5 YR 5/3 . . . . 116.5

Equality Formation
Carmi Member

5. Clay pebble conglomerate, brown, sandy; 7.5 YR 5/2 . 119.0

6. Clay, silty, pinkish gray to gray; clay pebbles; trace of sand; 7.5 YR 6/2 to 10 YR 5/1 . . 144.0

CORE 822

Lat. 42°12.8'N, long. 87°22.5'W;
water depth 245 feet (74.7 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, silty and clayey, dark grayish brown, very soft; hard beds of yellow-brown silt near base; 2.5 Y 4/2, 10 YR 4/2 . . . . 6.0

2. Silt, clayey, dark gray; trace of sand; some black mottling; 5 Y 4/1 . . . . 21.5

Lake Forest Member

3. Clay, silty, grayish brown; black beds and mottling; trace of sand; fossils; 10 YR 5/2 . . . . 59.0

Winnetka Member

4. Clay, grayish brown; faint black beds and mottling; 10 YR 5/2 . . . . 109.2

5. Clay, brown; 7.5 YR 5/2 . . . . 113.0

6. Sand, lenticular, coarse grained; shell fragments; a little clay; 7.5 YR 5/2 . . . . . 114.3

7. Silt, clayey, brown to gray brown; irregular bedding; 7.5 YR 5/2, 10 YR 5/2 . . . . . 130.7

8. Sand, fine grained, gray; trace of clay; 10 YR 5/2, 5/1 . . . . 135.2

Sheboygan and South Haven Members undifferentiated

9. Clay, reddish brown; 5 YR 5/3 . . . . 144.0

CORE 828

Lat. 42°07.7'N, long. 87°23.4'W;
water depth 198 feet (60.4 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, brown, coarse grained at top, becoming silty downward; 10 YR 4/3 . . . . 4.0

2. Silt, clayey, sandy, brown; some dark brown mottling; 7.5 YR 5/4 . . . . 17.0

Winnetka Member (?)

3. Clay, silty, grayish brown; trace of sand; faint black beds and mottling; a few fossils; 10 YR 5/2 . . . . 104.4

4. Clay, silty, grayish brown; thin beds of gray silt; 10 YR 5/2 . . . 124.5

CORE 829

Lat. 42°07.7'N, long. 87°06.9'W; water depth 270 feet (82.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, dark brown, coarse grained; 10 YR 3/3 . . . . 0.1

2. Silt, dark brown mottled with light and dark brown; trace of sand and clay; thin, hard beds of silt at base; 10 YR 4/3, 5/3 . . . 17.0

Winnetka Member

3. Clay, silty, brown mottled with light and dark brown; some sand; thin, hard silt layers at top; 7.5 YR 5/2 . . . . 41.2

4. Sand, brown, coarse grained; a few pebbles; shell fragments; 7.5 YR 5/2 . . . . 44.0

Equality Formation
Carmi Member

5. Clay, silty, sticky; alternates with clay pebble conglomerate; rock pebbles; trace of sand; distorted bedding; 7.5 YR 5/2, 4/2; 10 YR 5/1 . . . . 126.0

Wedron Formation
Wadsworth Member

6. Till, clayey, dark gray, hard and firm; trace of silt and sand; rock pebbles; 10 YR 4/1 . . . . . 138.5

CORE 830

Lat. 42°07.7'N, long. 86°57.6'W; water depth 301 feet (91.7 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, dark gray to grayish brown; some light brown mottling; trace of sand; a few hard silt beds; 5 Y 3/1; 10 YR 4/2, 4/1 . . . 14.2

Lake Forest Member

2. Clay, silty, gray; trace of sand; black beds and mottling; 10 YR 5/1 . . . . 54.5

Winnetka Member

3. Clay, grayish brown to brown; trace of silt and sand; faint black mottling; beds of gray silt; 10 YR 5/3 . . . . . 175.0

Sheboygan Member

4. Clay, reddish brown to brownish gray; 5 YR 5/3, 5/2; 10 YR 5/2 . . . . . . 188.0

Wilmette Bed

5. Clay, dark gray; trace of black and light gray mottling; 5 Y 4/1 . . 195.0

6. Clay, dark brown to reddish brown, faulted; 5 YR 5/4, 5/2; 7.5 YR 5/2 . . . . 212.0

South Haven Member

7. Clay, reddish brown; 5 YR 5/3 . . . . 237.0

CORE 831

Lat. 42°07.7'N, 86°51.8'W;
water depth 297 feet (90.5 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, black, soft; 5 Y 2/1 . . . . . . 5.5

2. Silt, sandy, dark gray; faint black beds and mottling; 5 Y 3/1, 4/1 . . 53.5

Lake Forest Member

3. Clay, silty, gray; trace of sand; black beds and mottling; 10 YR 5/1 . . . 106.0

Winnetka Member

4. Clay, grayish brown; trace of sand; faint bedding; trace of black mottling; beds of gray silt (1 to 2 mm thick) near base; 10 YR 5/2 . . . . 243.5

CORE 832

Lat. 42°07.7'N, long. 86°45.8'W;
water depth 257 feet (78.3 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, very dark gray; very soft and fluid; black beds and mottling; 5 Y 3/1 . . . . 36.5

2. Clay, silty, dark gray; trace of sand; faint black beds and mottling; 5 Y 4/1. 70.2

Lake Forest Member

3. Clay, gray; trace of silt and sand; fossils; black beds and mottling; 10 YR 5/1 . . . . 99.5

Winnetka Member

4. Clay, sandy, brownish gray; faint black beds; 10 YR 5/2 . . . . 242.0

CORE 836

Lat. 42°02.7'N, long. 86°43.5'W;
water depth 182 feet (55.5 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, black; 5 Y 2/1 . . . . 5.0

2. Silt, clayey, dark gray; trace of sand; faint bedding; 5 Y 4/1 . . 88.5

3. Clay, silty, dark gray; trace of sand; faint black beds; 5 Y 4/1 . . . . 193.0

4. Clay, silty, olive gray; trace of sand; 5 Y 4/2 . . . . 205.0

CORE 837

Lat. 42°02.7'N, long. 86°48.2'W; water depth 223 feet (68.0 m).

Pleistocene Series
Lake Michigan Formation
Waukegan Member

Depth (cm)

1. Silt, dark gray, soft and water saturated; trace of sand; 5 Y 4/1 . . . . . 59.0

CORE 838

Lat. 42°02.7'N, long. 87°02.2'W; water depth 250 feet (76.2 m).

Pleistocene Series
Lake Michigan Formation
Waukegan Member

Depth (cm)

1. Silt, very dark gray; very soft; trace of sand; black mottling; 5 Y 3/1 . . . . 62.5

Lake Forest Member

2. Clay, gray; trace of sand; black beds; 10 YR 5/1 . . . 117.0

Winnetka Member

3. Clay, grayish brown; irregular black beds and mottling; 10 YR 5/2 . . . . 157.4

Sheboygan Member (?)

4. Clay, brown; faint black mottling; 7.5 YR 5/2 . . . . 172.0

Equality Formation
Carmi Member

5. Sand, coarse, brown, clean; 7.5 YR 5/2 . . . . 172.2

6. Clay, sandy, brown; 7.5 YR 5/2 . . . . 176.0

7. Sand, clayey, brown; irregular beds of coarse sand; pebbles up to 0.5 cm; 7.5 YR 5/2 . . . . 179.5

CORE 839

Lat. 42°02.7'N, long. 87°11.7'W; water depth 175 feet (53.3 m).

Pleistocene Series
Lake Michigan Formation
Waukegan Member

Depth (cm)

1. Sand, silty, brown; 10 YR 4/3 . . . . 3.0

2. Clay, silty, brown; trace of sand; fossils; 7.5 YR 5/4 . . . . . 21.3

Lake Forest Member

3. Clay, gray; black beds and mottling; trace of sand and fossils; 10 YR 5/1 . . . . 66.0

Equality Formation (?)
Carmi Member (?)

4. Gravel, sandy; pebbles up to 5 cm in diameter . . 69.0

Wedron Formation
Wadsworth Member

5. Till, clayey, dark gray, firm, compact; trace of sand and pebbles; 10 YR 4/1	79.0

CORE 852

Lat. 41°57.7'N, long. 87°02.3'W;
water depth 190 feet (57.9 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Sand, silty, dark brown; 10 YR 4/3	9.0
2. Silt, sandy, dark grayish brown; a few pebbles; beds of fine sand 1 mm thick; 10 YR 5/2	11.2
3. Silt, sandy, dark gray, soft; black mottling; 5 Y 4/1	21.5

CORE 853

Lat. 41°57.7'N, long. 86°48.7'W;
water depth 170 feet (51.8 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Sand, fine grained, black; trace of silt; 5 Y 2/1	2.0
2. Silt, clayey, dark gray; trace of sand; 5 Y 4/1	135.0
Lake Forest Member	
3. Clay, dark gray; trace of sand and silt; faint black beds and mottling; 10 YR 4/1	185.0

CORE 858

Lat. 41°57.7'N, long. 86°57.5'W;
water depth 197 feet (60.0 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, very dark gray, very soft; trace of sand; 5 Y 3/1	7.0
2. Silt, clayey, very dark gray, very soft at top, firmer at base; trace of sand; faint bedding; 5 Y 3/1	86.0
Lake Forest Member	
3. Clay, gray; faint black beds and mottling; 10 YR 5/1	148.0

CORE 859

Lat. 42°55.0'N, long. 86°57.0'W;
water depth 398 feet (121.3 m).

Pleistocene Series Lake Michigan Formation Waukegan Member	Depth (cm)
1. Silt, sandy and clayey, dark brown to grayish brown; 10 YR 3/2, 3/3	5.9
2. Silt, dark gray, soft; faint black beds and mottling; 5 Y 4/1 . . .	18.2
3. Clay, dark gray; trace of silt; black beds and mottling; 5 Y 4/1	46.7

Lake Forest Member

4. Clay, gray; black beds and mottling; a few fossils; 10 YR 5/1 . . . . 115.0

Winnetka Member

5. Clay, grayish brown; some black beds and mottling; 10 YR 5/2 . . . . 168.0

Sheboygan Member

6. Clay, brown to reddish gray; trace of black mottling; 7.5 YR 5/2; 5 YR 5/2 . . . . 215.5

Wilmette Bed

7. Clay, dark gray; black mottling and beds; mottling of light and dark gray; 5 Y 4/1 . . . . 226.5

8. Clay, several shades of red; trace of black mottling; 7.5 YR 4/2, 5 YR 5/4, 4/2 . . . . 249.0

South Haven Member

9. Clay, reddish brown; trace of black mottling; 5 YR 5/3 . . . . 255.0

CORE 860

Lat. 43°05.0'N, long. 86°57.0'W; water depth 285 feet (86.9 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, dark brown; 10 YR 3/3 0.3

Unnamed formation

2. Till, clayey, brown, firm; some silt and sand; 7.5 YR 5/2 . . . . . 19.5

CORE 861

Lat. 43°05.0'N, long. 89°15.0'W; water depth 252 feet (76.8 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Sheboygan Member

1. Clay, sandy, reddish brown mottled with dark brown; 5 YR 5/3 . . . 13.6

2. Clay, reddish brown mottled with dark brown; 5 YR 5/4 . . . . . 34.1

Wilmette Bed

3. Clay, gray; faint black mottling; mottled with lighter and darker gray; 5 Y 5/1 . . . . 51.0

4. Clay, alternating beds of dark brown and reddish brown; 7.5 YR 4/2; 5 YR 5/3, 5/4 . . . . . . 84.3

South Haven Member

5. Clay, reddish brown; faint bedding; 5 YR 5/3 . . . . 201.0

Equality Formation
Carmi Member

6. Clay, silty and sandy, grayish brown, firm, compact; rock pebbles and clay pebbles; 10 YR 5/2 . . . . . 236.5

7. Clay pebble conglomerate, brown; sandy matrix; rock pebbles; 7.5 YR 5/2 . . . . 263.0

Unnamed formation

8. Till (?), silty, clayey, sandy, gray; a few pebbles; 10 YR 5/1 . . . . 265.5

CORE 863

Lat. 43°05.0'N, long. 87°30.0'W; water depth 307 feet (93.6 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, clayey, very dark gray; trace of sand; mottled with lighter brownish gray; trace of black mottling; hard brown silt bed 1 mm thick at 3.8 and 6.3 cm; 10 YR 3/1 . . . . . 10.3

Lake Forest Member

2. Clay, gray; black beds; a few fossils; 10 YR 5/1 . . . . 72.3

Winnetka Member

3. Clay, grayish brown; faint black beds and black mottling; a few fossils; 10 YR 5/2 . . . . 170.0

4. Clay, brown; trace of silt; faint bedding; beds of gray silt in lower part; 7.5 YR 5/2 . . 244.2

CORE 867

Lat. 42°55.0'N, long. 87°12.0'W; water depth 336 feet (102.4 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Sheboygan Member

1. Clay, silty, reddish brown; trace of sand; faint bedding; 5 YR 5/4 . . . . 6.7

Wilmette Bed

2. Clay, grayish brown, oxidized, mottled with lighter and darker brown; 10 YR 5/2 . . . 15.3

3. Clay, alternating beds of lighter and darker reddish brown; 5 YR 5/3, 5/4 . . . . 50.5

South Haven Member

4. Clay, reddish gray; faint bedding; 5 YR 5/2, 5/4 . . . . 90.2

5. Clay, brown; faint bedding; 7.5 YR 5/2 . . . . 107.5

Equality Formation
Carmi Member

6. Clay, silty, grayish brown; trace of sand, clay pebbles and rock pebbles; 10 YR 5/2 . . . . 123.0

7. Clay pebble conglomerate, grayish brown; sandy clay matrix; small rock pebbles; some thin beds of clay in lower part; 7.5 YR 5/2 . . 225.0

Unnamed formation

8. Till (?), clay pebbles and rock pebbles in tough and sticky silty clay matrix, brown; 7.5 YR 5/2 . . . . 242.0

CORE 868

Lat. 42°55.0'N, long. 87°04.9'W;
water depth 325 feet (99.1 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Sand, coarse, light reddish brown, soft; 5 YR 6/3 . . . . 3.0

Equality Formation
Carmi Member

2. Clay, silty and sandy; light reddish brown; firm and compact; clay and rock pebbles; 5 YR 6/3, 5/2 . . . . 61.0
3. Clay, sandy, brown; a few small pebbles; 7.5 YR 5/2 . . . . 85.0
4. Clay pebble conglomerate, brown; sandy clay matrix; 7.5 YR 5/2 . . . . 128.0

CORE 869

Lat. 42°55.0'N, long. 86°38.0'W;
water depth 302 feet (92.0 m).

Pleistocene Series — Depth (cm)
Lake Michigan Formation
Waukegan Member

1. Silt, sandy, dark olive gray, soft; 5 Y 3/2 . . . . 5.1
2. Silt, black; trace of sand; trace of black mottling; 5 Y 2/1 . . . . 30.0
3. Silt, sandy and clayey, very dark gray to dark gray; faint black beds; 5 Y 3/1 to 4/1. . . . . 73.5

Lake Forest Member

4. Clay, silty, gray; trace of sand; black beds and mottling; fossils; 10 YR 5/1 . . . . 153.0

Winnetka Member

5. Clay, grayish brown; some black beds; gray silt beds near base; 10 YR 5/2 . . . . 169.0

Sheboygan Member

6. Clay, reddish brown; faint bedding; 5 YR 5/4, 5/3 . . . . 182.0

South Haven Member

7. Clay, reddish gray; faint bedding; 5 YR 5/2 . . . . 206.0

Equality Formation
Carmi Member

8. Clay, brownish gray, sticky, firm; 10 YR 5/2 . . . . 213.0

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